

REMARKS

This application is amended in a manner to place it in condition for allowance at the time of the next Official Action.

Status of the Claims

Claims 11-19 and 22-27 are amended as to form.

Claims 1-27 remain in this application.

Claims 1-10, 20 and 21 have been withdrawn for being directed to a non-elected invention.

Objection to the Specification

The Specification was objected to for not including the appropriate headings, subheadings, and cross-reference to related application.

The Specification has been amended to include these features, and withdrawal of the objection is respectfully requested.

Objection to the Drawings

The drawings were objected to for using reference character "2" to designate both active material and electrodes. However, Applicants respectfully disagree.

The paragraph beginning at line 16 on page 5 of the originally filed specification states: "The invention concerns a method for producing a transistor 1 for active matrix display comprising the steps of forming an active material and

electrodes 2, said active material being formed using vapor deposition methods..." However, here "2" designates electrodes, and there is no designation for "active material". Indeed, this designation is consistent throughout the specification, e.g, on page 6, lines 26-30, which refers solely to "electrodes 2".

Thus, withdrawal of the objection is respectfully requested.

Claim Rejections-35 USC §103

Claims 11-13 were rejected under 35 U.S.C. §103(a) as being unpatentable over NAKATA U.S. 6,078,059 ("NAKATA(A)") in view of SHTEIN et al. U.S. 2003/0054586 A1 ("SHTEIN"). This rejection is respectfully traversed for the reasons below.

NAKATA(A) describes the fabrication of a thin film transistor, comprising a microcrystalline silicon film deposited on an insulating layer. Microcrystalline silicon film is obtained by vapor phase deposition, comprising a first step of amorphous silicon (a-Si) deposition and a second step of surface treatment of the a-Si film by an hydrogen plasma for forming microcrystalline silicon (μc-Si), these two steps being repeated periodically.

In these types of "layer by layer" deposition conditions, a layer of ~10 Å of a-Si:H is deposited, and then exposed a hydrogen plasma. This cycle is repeated until a film about 500 Å thick is obtained, with a μc-Si film crystalline

volume fraction above 10% (See, e.g., Col. 3 L. 55-57) and at best of 70% (Col. 6 L. 65- Col. 7 L.4 and claim 6).

However, NAKATA (A) does not teach a fabrication process enabling to obtain a TFT comprising a microcrystalline silicon film having a crystalline fraction above 80%, as recited in the claimed invention.

Thus, independent claim 11 differs from NAKATA (A) in that the semiconductor film comprises a crystalline fraction of above 80%, with grains of sizes between 10nm and 400nm.

SHTEIN describes an organic vapor phase deposition process (OVPD) for depositing an organic polycrystalline film, in particular pentacene. However, SHTEIN fails to disclose a process for fabrication of microcrystalline silicon film.

As microcrystalline silicon is not an organic material, and is not obtained by OVPD, for the purpose of forming an inorganic microcrystalline silicon as taught by NAKATA (A), SHTEIN would have been considered non-analogous art.

Thus, SHTEIN fails to remedy the deficiencies of NAKATA (A) for reference purposes, as SHTEIN would have failed to give any guidance to modify the process of forming an inorganic microcrystalline silicon as taught by NAKATA (A).

Furthermore, SHTEIN does not seem to be relevant to the claimed invention.

Therefore, the combination fails to render obvious claim 11, and dependent claims 12 and 13, and withdrawal of the rejection is respectfully requested.

Claims 11, 15-19 and 22-27 were rejected under 35 U.S.C. §103(a) as being unpatentable over NAKATA et al. U.S. 5,796,116 ("NAKATA(B)") in view of NAKATA U.S. 6,078,059 ("NAKATA(A)"). This rejection is respectfully traversed for the reasons below.

NAKATA (B) describes a process for fabricating TFT comprising a microcrystalline silicon film, obtained by successive vapor phase deposition of silicon and then exposure to an hydrogen plasma.

However, the maximum crystalline volume fraction of the μ c-Si film thus obtained is 70% (Col. 12 L. 40, tables 1 and 2).

Thus, independent claim 11 differs from NAKATA (B) in that the semiconductor film comprises a crystalline fraction of above 80% with grains of a size between 10nm and 400nm.

NAKATA(A), however, does not remedy the shortcomings of NAKATA(B) for reference purposes, since, as discussed above, NAKATA (A) also fails to teach a fabrication process enabling to obtain a TFT comprising a microcrystalline silicon film having a crystalline fraction above 80% with grains of a size between 10nm and 400nm.

Thus, neither NAKATA (A) nor NAKATA (B) discloses a process for fabricating μ c-Si film wherein said crystalline fraction is above 80%.

As disclosed in the present specification, a crystalline volume fraction above 80 % is essential for the stability of TFTs (see, e.g., paragraphs [005]-[006]).

On the contrary, NAKATA (A) and NAKATA (B) both disclose a maximum of 70% crystalline volume fraction. Accordingly, one of ordinary skill in the art would have concluded from NAKATA (A) and NAKATA (B) that the fabrication process comprises a maximum attainable μ c-Si crystalline fraction limit of 70%.

Indeed, desiring to develop μ c-Si films for TFT applications, wherein a crystalline volume fraction above 80% is necessary for the stability of TFTs, there is nothing in these documents to even suggest to one of ordinary skill in the art to adjust any of the multiple parameters in PECVD deposition technique to reach a crystalline fraction out of the range 10% and 70%.

Accordingly, it would have been unobvious to one of ordinary skill in the art, by simple routine operations, to adapt the processing parameters described in NAKATA(A) and NAKATA(B) (for example temperature), to obtain a process enabling fabrication of a μ c-Si film having a crystalline fraction above 80%.

Therefore, their combination fails to render obvious claim 11, and dependent claims 15-19 and 22-27, and withdrawal of the rejection is respectfully requested.

Conclusion

In view of the amendment to the claims and the foregoing remarks, this application is in condition for allowance at the time of the next Official Action. Allowance and passage to issue on that basis is respectfully requested.

Should there be any matters that need to be resolved in the present application, the Examiner is respectfully requested to contact the undersigned at the telephone number listed below.

The Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to our credit card which is being paid online simultaneously herewith for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17.

Respectfully submitted,

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